

AN INTERVIEW WITH

ROBERT MACMILLAN
(ENGINEER)

BY

J.N. LUDLOW

R. MACMILLAN

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JNL

Mr. Macmillan perhaps we could commence this interview by you giving a little bit of background as to your education and what led you into Consulting Engineering.

REM

Well I went to Sydney University in 1922. Back in those days it was interesting to note how different the arrangement at the University is now from what they were then.

I had no idea of taking engineering at school when I did the Leaving Certificate but I did so well in the Leaving Certificate that I got a Bursary that only 20 were granted - an exhibition and I thought I should take out a professional course and I took engineering not that it was a thing that I liked best but because it was a thing that was most available. I wanted to do Law mainly but my father told me that there were too many lawyers sitting on their tails in Phillip St. without making any money. I found medicine a bit morbid and I was influenced by the fact that so many fellows that went to my old school took engineering that I followed that procedure - I didn't have any bent really for engineering but if I had to pick something it was the thing that fell out as most practical. I didn't want to go to teaching and do science.

I found out then that to do engineering I had to do a particular paper that was set out at the leaving certificate by old Professor Warren who was the first Professor of engineering at Sydney University. It was his idea that an engineer should not only be technical but also he should be a gentleman with wide knowledge and he set a paper in English literature and Geography because he thought that they were two very important subjects.

Now this paper was never failed by anybody as far as I could make out but I did not take it and I decided to do engineering after the matriculation and I had no chance of taking it and Warren refused to let me do engineering without it and the University was cranky about that because they thought it wasn't right but in those days the Deans of all the Faculties was a very powerful fellow. His word was absolute law. The senate or any other body didn't seem to be able to make any impression on him, he was a law unto himself and Professor Warren ruled that if I did one year in Arts at the Sydney University it would equivalent to taking this paper of his despite the fact that no engineer that I knew prepared particularly for it.

Now I had done an honours in English and I knew my English Literature and I got an 'A' in Geography at the intermediate certificate without studying it apart from what I did in Primary School. Anyhow I had to do one year of Arts before I did engineering. The Education Dept. was so annoyed about this that they extended my Bursary for 12 months and the University extended my exhibition for 12 months to enable me to do this.

They said that they felt very annoyed about it but they couldn't override the faculty. Anyhow I did 4 years of engineering and I did pretty well and graduated with first class honours.

My first job was with the Sydney Harbour I was with them for 12 months - I did a wonderful job. In the morning I was in charge of the outside rock eastern channel of Sydney Harbour

Distortion.

Within 12 months I got offered a job with the Sydney Council with about 50% increase in salary and I went to Sydney Council. I took the place of Herb Smith who was also a consulting engineer. He left the Council to go to R.S. Morris consulting engineer and I took his place and this was at a period at which Sydney was very busy

Distortion

Some of the most famous buildings in Sydney such as State Theatre, the BMA building and Grace Bros. in York Street went up in this period now I was involved in checking the designs of Sydney buildings. This would only have been started about 2 years before I went with them - John Rankin was appointed.

Distortion

We used to have to work a lot of overtime

Distortion

The engineers used to get out and check some of the buildings and I remember on Grace Bros. Building in York St. I went on to that to check and the very big steel frame building and I caused a furore by actually checking up the rivets and I condemned 25% of them which was about 3 or 5 floors up by then and this caused a furore because nobody had bothered to check rivets before then and I hit them with a hammer and they were hollow and I condemned them and that caused quite a furore. Back in those days a lot of buildings went up like I said the State Theatre, the BMA and Grace Bros. and many others, theatres and so forth went up and after being at the City Council for 2 years being assistant

Distortion

Charlie Willie who was the Chief engineer for one of the reinforcement companies, Truss Concrete and there was A.S. Macdonald who was out there at that time and then Alec Morrison came in but both of these firms were connected with steel firm. Alec Morrison was really the first to be not connected with a steel firm. Eric Wagner came after that.

I was only with Alec Morrison for about 18 months when the 1929 depression hit and I never thought that this would happen to me because I had an agreement with Morrison that I get quite a bit of money more

than I got with the Council and I got an increase with him every three years - my agreement with him was for 3 years but after 18 months the depression hit and he suddenly found that his jobs were being stopped, he used to come in and say Mac get off that job it's being stopped. It wont be going on and in a very short time we had nothing to do.

I was only a single fellow at the time and seeing Morrison didn't have any work I said to Morrison well I wont hold you to my agreement Alec because you are a young man with a family and I'm a single fellow and I know that you would employ me if you had the work and I was out of work for nearly two years.

JNL

What did you do in that period of two years?

REM

During that two years I tried really hard to get any sort of a job without any success at all. Any job that I put in for in the engineering content seemed that I had only about 3 to 4 years experience. I found that Chief engineers from various shows were in for the same thing and were willing to work for relatively small amounts of money and I remember putting in for a job as Assistant engineer at North Sydney Council and I think that was a fiver a week and you had to live within the Council to get that and that was got by a very top engineer who was out of work and when I could see that there was nothing done in my own field I used to apply for jobs in other various fields, some fields in which I didn't have any expertise but I used put my application in and rush down the State Library and get out all the books I could see and swot like mad in case so that I could get enough knowledge to hold the job down.

I remember joining queues a hundred yards long. I remember putting in for a job as a salesman with the MLC Insurance Company and I got there at about 9 O'clock and the queue already stretched down Martin Place to Pitt Street and then went down about 50 yards into Pitt Street. I never thought I would make much of a salesman anyway and I didn't impress them and I didn't get the job.

So after 2 years I was getting desperate and I decided that I'd go in and try and get a little office for myself and try and get some consulting work, I didn't need very much to keep me going and when I was walking around town looking for office space I met Macdonald and I told him what I was going to do, he said "don't do that Mac, come and work for me - I'm getting a bit of work now" so I went and worked for Macdonald. I will always remember that Macdonald paid me 5 quid a week and I was really glad to get it and I went to work for him and gradually I was getting more as he got pretty busy and I used to work quite a lot of overtime for which he paid me.

While I was with Macdonald I did quite a lot of big buildings and I did the first two big buildings in Wellington, New Zealand that were designed according to the earthquake regulations

Distortion

After two years I tried to get out on my own not because I was anxious to make a lot more money but I was a single fellow and I wanted to have a bit more say in how I spent my time and having a bit more life and I thought if I got out on my own and got enough work to keep going I would be able to play golf one afternoon a week and just more or less limit myself as to how much overtime I did. It didn't turn out that way - I joined a golf course and I think I had three afternoons of golf then I got so busy that I didn't have any more golf.

In 1936 I had my own office in Barrack Street. I employed a part time draftsman for a few months then advertised and got another draftsman who was a very good draftsman and I gradually built up from there.

Back in those days the situation was different from what it is now in that one engineer could keep about three or four draftsmen going and the standard of work as far as drafting was concerned was not the same peak which is reached now a lot of information was put on the plan, all the plans were done on paper and no ??? and reinforcement was shown on small scale plans and you used to be able to turn out a lot of work. An engineer today doesn't turn out nearly the same amount because he puts more into it and the drawings are so much more detailed and so forth and I did quite a lot of factories, churches and theatres and hotels, many hotels, flats, many, many big blocks of flats particularly for the Housing Commission.

One of the things that I would like to mention is that when I started out in structural engineering there was no course in structural given in structural engineering in any of the technical colleges or universities. Professor Miller of Sydney University with whom I discussed it said "we have not reached the stage where it could be considered as a university course. It didn't merit a university course" despite the fact that buildings were gradually being changed over to welding and so in 1938 I think it was, it was decided that Sydney Technical College would run a post graduate course in welding engineering and I and Ralph Griffin who was a Mechanical Engineers made joint lecturers in structural welding at Sydney Technical College. It was only open to graduates of the college or Sydney University and I think there was about 25 engineers that took that course and perhaps less than that and it was very much sought after because there was no other way of learning except for doing the book reading yourself and a lot of engineers that did that course actually got good jobs later on.

They became very much in demand because of their knowledge of engineering and it was one indication of how bureaucracy badly planned education. My course consisted of doing a 3 hour lecture straight off one day a week so that people who were doing engineering jobs all day would come up to the Technical College and I just had time to jump in my car - run off without any tea - and lecture for 3 hours straight off and after 4 or 5 weeks I said that it was impossible because it took such a

lot of time to prepare this job. The students were too tired to go flat out, so they broke this up into 2 periods of an hour and a half each. The first part was lecture and the other part of tutorial in which we set exercises for the students and went around and checked with them and I asked for an assistant in that respect and Ray Priddle was made my tutorial Engineer and that gradually became a very useful course although it only went for one year but welding gradually took over from riveting in those days and one of the things that I would like to mention is the way in which structural engineering started as far as payments were concerned.

Distortion

We got paid by getting the payment from reinforcement companies who supplied the reinforcement

Distortion

The builder saw in the specification that the sum for reinforcement was \$1000 and the consulting engineer was supposed to be paid so many pounds per tonne, I think it was some very lowly amount like 30 shillings a tonne to start. This went on for quite a few years and engineers did not seem to worry about it.

I worried but there was a case in New Zealand that came to law in which one of the engineers there operated on the same basis and the Judge said it was a scandal. It was just a fraud that engineers should cover their fees in this way. That caused a bit of a stir in Sydney amongst the consulting engineers because they could see it was going to be a case that would hit them and some years later the move to form a structural association and this was one of things that had to be fixed up as to how to stabilise engineer's fees.

If there was structural steel involved in a job actually the fee for the structural steel was put in with the fee for the reinforcement and it was never challenged in Sydney until we got around to getting the Architects to put it in, and they were most reluctant, that the structural engineer was to be paid a fee of so much and that then became the way engineers were paid. He was paid for structural engineering design and I think he was paid for reinforced concrete design on a basis of so much per tonne steel.

Back in those days there was very little knowledge amongst engineers about the relative costs of concrete and steel buildings and it used to be mentioned that engineers felt that a reinforced job possibly cost not more than 15 - 20% more than a structural steel job and, of course, the clients felt that there was such a lot to be gained by having smaller columns and smaller beams and so forth that nearly all the big buildings were done in structural steel and I remember that I had gone into the matter of the cost because I patented a means of building which involved using steel beams built up out of reinforcement which could be designed and reinforced concrete beams but the technique for building would be the same as for structural steel.

Steel columns remained the same so that they were small and the fabricated beams were lifted into place and the building went up four or five storeys ahead of the concreting and the concreting followed the same as for the structural steel.

Now I put a paper in the Building Magazine that gave a design of a building in structural steel and also it gave a cost for both structural steel and concrete columns and structural steel and concrete beams and I set out the whole costing of the building and that was published in the Building Magazine and I asked consulting engineers to debate that if possible, and I showed that the reinforced concrete was up to 50% cheaper than the structural steel building when everything was taken into account so far as the structural costs were concerned but nobody answered that. For years after that clients asked for steel buildings in structural steel and I remember the big job I did for Hoffman's in Clarence Street, I was designing the thing in concrete and the client, Hoffman Limited, said that they wanted it like other people to have it in structural steel and I said if they gave me a letter instructing me to build in concrete I would gladly do that because I did half as much work and got twice as much fee for doing it than in structural steel and they wrote to say put it in reinforced concrete and gradually people began to realise that reinforced concrete showed such big savings and nobody doubted it.

Up to 20 years ago people were accepting that there were very big savings in reinforced concrete as against structural steel and a number of buildings were built in my design and construction. The Rural Bank in Martin Place was one that caused a lot publicity because people could see this building going up and instead of usual ~~eye~~-shaped section there was just a beam going up built out of rods and it was designed mainly as a reinforced concrete beam but it was designed for continuity so it got all the benefits of continuity and you also had the benefit of getting ahead and making speedier than reinforced concrete because you get ahead with your structural steel and spread your construction over several floors.

The Mater Hospital Maternity Block in North Sydney was also done in that and the Great Northern Hotel for which Morrison was the engineer, I just supplied the design in my patented beam.

Then the War came and during the War I became very interested in War preparations in changing buildings to be resistant to War and providing air raid shelters and I was asked by the Commonwealth Government to become an advisor to them as a matter of fact they asked The Institution of engineers to recommend somebody to become advisor to them on air raid precautions and be concerned with the engineering side of War structures and I became Chief Advisor and when Darwin was bombed I was sent up to Darwin to report on the bombing of Darwin and when I came back I wrote quite a long report on the bombing of Darwin with photographs of the damage.

I was supposed to stay up there to survive ten bombings, which I did and found out quite a lot which I didn't know before, about the effects of bombs and when I came back I was shortly after approached by them to become their Chief Advisor and full time advisor and I agreed to be this so long as I could be second in command and second highest in seniority in the Dept. of Home Security which ran this business and that was agreed to and I was for a couple of years with the Dept. of Home Security as Chief Technical Advisor.

During that time I wrote a lot of specifications for air raid shelters and protection of dangerous materials and so forth and near the end of my time there I wrote a book for the Dept. on the influence of the War in town planning and building construction and that was published by the Commonwealth Government and it is in most of the libraries around the State now and that became the text for buildings that were designed by the Commonwealth Government after the War where they tried to incorporate design against future effects of War.

I used to get a lot of secret materials in my job as Chief Technical Advisor, engineering for the Dept. and I remember getting some papers out from England on the Atomic Bomb.

I thought that was rather strange that the people of very top calibre should be employed to write papers on this when it was such a long range thing. Anyway I wrote this paper and in my introduction to my book I said that the Atomic Bomb was a thing for the future and it would probably take some time, if ever. Rutherford said it would never be of any use at all, it would never come about.

Just a couple of months after my book was published, I went out of my office one afternoon and there on the placard was the sign "Atomic Bomb on Tokyo" and so a lot of the things I had written about the lesson of the War were out of date overnight and the Dept. pestered me for 12 months after that to write a sequel to my book on the effects of atomic bombing on structures which I eventually wrote something for them.

So then after the War I got back into structural engineering and it was very difficult in those days to get an office and the minister in charge of my Dept. actually helped me to get an office in Bridge Street and I started up my own practice.

During the War A.S. Macdonald were actually looking after my practice. I handed my practice over to him and it ran down during the War. I had to start from scratch after that and I gave quite a bit of serious thought as to whether I could get stuck into trying to arrange a practice again but it seemed to me to be the best thing to do so I started back in the practice.

I gradually built it up again and after the War I took a couple of engineers from Sydney University in as employees, one of them was Bob Little another was a chap who stayed with me for a couple of years then left me to become a medico. He went back to the University to do medicine and he is a medico now.

Bob Little joined me before the War and after the War I set up and worked on my own for quite a while and gradually had other engineers to join me.

In 1951 I was joined in my practice by Sandy Britton who up to that stage had been what they called The Brains Trust of the Dept. of Main Roads. Sandy Britton was at the University with me and he was a most fabulous fellow, he was then reckoned by Professor Carlslaw, Professor of Mathematics, to be the most brilliant mathematician he had ever met and he was such a brilliant mathematician that in my presence Carlslaw asked him to go and do research work with him when he was only 3 months out from high school and Carlslaw reckoned that the greatest mathematician of all time was Karl Gaus the German and as a pure mathematician, he rated him ahead of Newton.

One day Carlslaw said to us that when Mr. Britton goes to Cambridge they'll think another Karl Gaus has just walked in. That's what he thought about him. Britton was the most fabulous fellow at the University - he came top in everything in the sciences. He was a very poor draftsman, he did very badly in that and people found it very hard to understand his writing but he became a fabulous fellow for his knowledge of everything. In fact the Professor of engineering told me that it was wrong in University for the man to sit in at lectures because he felt that looking down at Britton as he gave his lectures that he possibly knew as much about the subject of the lecture as he did and he thought that it was quite wrong because Britton used to get pretty restless, he reckoned he knew it, I suppose, but he had to sit there through the lectures and Sandy Britton attended as few lectures as he could. He used to spend quite a lot of time playing billiards when ever he could get out of lectures and yet he graduated with a medal.

I never thought that Britton would become my partner but Britton got frustrated at the way things were going at the Main Roads Board. Everybody there regarded him as being an absolute genius and the Chief Commissioner, Sherrard, who was before then, Chief engineer, told me that Sandy Britton was never asked his opinion about any subject at all at the Main Roads Boards in which he didn't make a very suitable contribution and so Sherrard thought Britton was wonderful and in 1951 when he got frustrated with the Main Roads Board, he took an offer which was understanding for him for some years.

I tried to get him to join me and he decided he would and after that life became a lot easier for me, to have such a man at your elbow to whom you could turn, I felt that I would sooner have Sandy Britton there than 5 other engineers to be able to get a second opinion on anything.

Sandy Britton did some very wonderful work while he was with me and he was with me until the time he died about 7 or 8 years ago.

After the War years, Britton and I went up to the University and became Teaching Fellows to help out with the large number of students that came after the War. The number of students in civil engineering became so

great that they needed help with tutorials and so forth and Sandy and I became Teaching Fellows in engineering Design and that was at night to help out.

So the type of work I did changed a little bit after Britton joined because as well as doing building work we did roads and bridges and drainage as well and Britton used to do those as well as building and we came to the stage in which we had a lot of bridge work to do and eventually got to do up in the islands in Sarawak, the firm still does a lot of work in the islands in Indonesia. Would you like me to go back to the earlier years.

JNL

Well it would be nice if you could give me a little more information on those years with A.S. Macdonald and also your early years before the War.

REM

Well, when I left the City Council, I joined A.W. Morrison and there was only himself and myself as Engineers and we had a few draftsmen and when I went to A.S. Macdonald there was Macdonald and myself as his chief assistant and back in those days I think there were four or five draftsmen in the firm but there wasn't the same attention paid to the drafting side of it that there is now and when I found that I was working so hard on so much overtime and I was single, I decided that I would change my life before I came too involved in overtime and I decided I'd get out on my own and lead a quieter existence. Play a little golf and have enough time to spend on subjects in which I was interested and then Eric Wagner joined. Macdonald went overseas.

I had only been with him for a couple of years and Eric had a practice of his own. Macdonald talked Eric into giving up his practice and joining him and so it was shortly after that I decided I would start out on my own and I got on quite well with Eric but I thought that I would have to do something about this instead of working myself to death and I had no intention of doing this some time before because it was a decision that was almost taken in a matter of a couple of weeks and so when I started out on my own I gradually built up to have three draftsmen and I did all the design myself and I found civil engineering a very strenuous life but as I say, I drifted into it not because I was a born engineer and that was the only thing I wanted to do.

I came back to engineering after eliminating the other things such as medicine and law and as I say I started off with Macdonald at 5 pounds a week and when I started off on my own I thought to myself that I would like to build up to the stage that I made 1,000 pounds a year I'd be happy and pretty soon I was making that amount of money and gradually things got better but of course, in those days there was no inflation.

Your income tended to be more or less gradually increasing with the size of your practice and I had my office in Barrack Street and it remained like that until Britton joined me and we moved into Caltex House into

bigger offices and I left the engineering business before the computer became such an important part of the business. I did for a while have a computer terminal in the office in Barrack Street but we found that the computer firm didn't have the expertise to advise us on the use to us and they didn't have any engineers on their staff to know what we wanted and they had people that were trained as pure mathematicians that they called Systems Analysts and so on and so forth and I found after 12 months or so that it wasn't really paying for itself and I decided that it wasn't yet time to use the computer and we scrubbed it and now the firm has got back into the computer side of things but I decided then that I'd ride out engineering without becoming involved with computers.

I went on then even till the end I was doing a lot of detail work. It wasn't what I wanted out of life really, to become involved in engineering to the point in which I spent my life doing everything including detail work. I was always short of enough capital to employ enough staff to get out of doing the detail work myself and looking back over my engineering days, I don't know that it would be a thing that I would go for again. I did enjoy certain aspects of it but I did find that doing detail work was really frustrating but you get a lot of people who don't stick with the detail work don't know the fine points very often and they say well we will employ a bloke that does.

I always found an interest in doing a lot of work for the Standards Association because I was Chairman of the Committee that wrote the first welding code and that was for the Australian Welding Institute, we made a welding code which was one of the first in the world probably. It was the first in Sydney and the first in Australia. That was taken up and made a Standard Code by the Standards Association and I was on the Welding Committee of Standards for a number of years and I was also Chairman of the Loading Code of the Standards Association for very many years and it was only when I came near a time that I resigned from being Chairman of the Loading Code.

I was also a member of the structural Steel Committee for many years and a member of the Reinforced Concrete Committee for many years and I gave many, many hours of my time to the Standards Association and I did that because I felt that it was of some benefit to my practice. It was a way of learning and to be up in the latest that was permissible according to a code was a very important part of an engineers life and I found that a lot of people that weren't on committees like that would ring me up and ask me things about codes and it never yielded anything to me in the way of remuneration, I can only remember one job that I got out of my association with the Standards Association.

So that's how life went on until I retired about six years ago.

JNL

You mentioned that when you were working with the City Council there was very little supervision done of building projects and there were some inspectors employed by the Council. I wonder if you found that when you worked for Macdonald and later on on your own and then with Alec

Morrison, whether much supervision was done in those years by the consulting engineers on the projects you designed?

REM

Well, not such a lot, as a matter of fact, the engineer was largely concerned with the design only and it was a reinforced concrete job.

When I first started engineering, the Architect used to supervise all the concrete work and he used to supervise the laying of the reinforcement. Once in a while he might be asked to go out and check reinforcement and I think it's a wonder that more didn't go wrong with jobs in those days because they were given a pretty pre-emptory sort of a check. It was one aspect of things that the Architect wasn't terribly interested in and it tended to be neglected.

It was only gradually that the engineer was called in to take any part at all in supervision and I know when I condemned all these rivets in the Grace Bros building and the thing was reported to Charlie Reid who did the reinforcing design of the building, the Architect was most irate about it, he said Charlie Reid didn't have anything to do with it and so the supervision by engineers was a thing that built up very, very gradually and also a thing that has changed very much has been the amount of attention paid to foundations.

When I first became involved with structural engineering, it would be on a very rare occasion that you would have any test at all done on the soil to determine what it would take. You would go out and inspect the site. You might have a man to dig you a couple of holes in order that you find out what sort of soil you'd be sitting on and you used to assess what the soil could be classified as and you used to use the City Council building regulations as to what would be allowed on that soil. Soft clay, hard clay, shale, rock, sand, confined or otherwise and it was a pretty poor sort of a classification really and then we got to the stage when we use an auger, particularly if we had to go down through filling and so forth.

So an auger was used and a hole would be dug to find out what you would be sitting on and when the soil Consultants started up they found it a little bit hard to get in because the engineer used to go out as part of his business and give an assessment and say well we'll use two tonnes a square foot if it is going to be on reasonably firm clay and I remember having quite a lot of difficulty in talking my Architectural clients into employing soil analysts.

From my memory, the first fellow to start up in Sydney was Dave Coffey and Dave Coffey had run such a show with a partner in San Francisco or somewhere in the West Coast of America and came out here to a place where he was born to start up in that line and I remember telling him that I thought he would have a very rough time and that he would eventually find his way but he would find it pretty difficult. A lot of my Architectural clients used to resist employing Dave because they said well in the past you've done this and nothing's gone wrong and my only

reply to that was that I don't like fighting today's Wars with yesterday's weapons and gradually we were able to bring the soil Consultant in to the business and that applies to so many other branches of engineering.

Mechanical Consultants were practically unknown, air conditioning Consultants came gradually after that period and now it's built up into quite a big field in which there are many, many brands of consulting engineering but back in the days when the consulting structural engineer got his fees under the lap things were pretty primitive professionally.

JNL

What about the documents. You also said that we do far more details on our structural documents than before the War. Do you think that this is because there is more concern about variations and litigation. Was there a more gentlemanly arrangement between the builder and the client in those days?

REM

Well, back in those days litigation was hardly known and I can't remember when I started or anybody actually having insurance to cover anything going wrong. That took quite a long while to build up and very often you would find that if something went wrong on a job and the client went mad and realised he was in for big extras because of something that went wrong with the engineering side of things or the Architectural side of things, the general feeling was that the builder would advise the client to go ahead and have the thing done because the engineer and the Architect would probably go and sue them and find out that you'd got nothing.

Some jobs did go wrong and caused legal tussles and so forth and it was after this that the engineers came to the decision that they should be covered by insurance because they got a few fights about things that had gone wrong and legal tussles, I can't remember the details about any of them and gradually it came to amount to quite a sizeable sum the engineers had to cover and I remember I first covered myself for quite small amounts because I felt that I would be very unlucky to make a blue that would involve a collapse or anything of that nature.

Insurance for misdemeanors was unknown in the early stages. I think the first cases were against Architects rather than against engineers and mostly the way things were arranged, even where the engineer was concerned, the Architect, I think, would have been primarily involved because the client hardly knew of the involvement by the engineer. Actually he very often didn't know. The Architect was appointed by the client and he employed the engineer and put a P.C. sum in for his fees and so forth so if something went wrong, the client would go to the Architect and the Architect in those days would have had to take it on his own account and sue the engineer for a misdemeanour. Architects took pretty badly to carrying insurance and I think that engineers realising that there was more involved in the possibility of something going wrong with the structural side things than with the other sides of things that they were taking out engineering insurance on a larger scale

than the Architects were taking out insurance to cover themselves.

JNL

What about the documents - do you think it's just that things have become more complex as more detail is required because builders don't understand as much now as they did. I wondered why we seem to be showing more detail on our documents.

REM

Well, I think it's Parkinson's law coming into effect. If there are more complicated ways of doing things they gradually come to be accepted and also in those days the engineers had to cut their cloth to be in line with what they were paid to provide because it was impossible to give more for the amount of fees that we were getting. At one stage, pre-War and shortly after World War II, Some Melbourne engineers were acting for something like about half of what Sydney engineers were acting for and they were able to do this because they gave less service than the engineers. They used to do all things to a scale and there was a lot made the same but with regards to reinforcement, a lot of slabs were, say, repeat slab No.1 and the reinforcement wasn't drawn in despite the fact that the span etc. might be different so the engineers down in Melbourne found that they had to have some way of arranging that and engineers in Melbourne in those days were not adopting the principal that we had of being paid by the Builder through a P.C. sum in the specification. They were being paid straight out of the Architect's pocket. The Architect screwed them so that he got the amount of a pretty low fee.

I remember being approached by a very big firm of Melbourne Architects, one of the very biggest firms in Melbourne to do their structural work in Sydney and that amounted to a great lot because I had a lot of work in Sydney and the basis would be I'd be paid the same rate as their previous engineer with whom they had fallen out was paid in Melbourne and I had to turn that down because I said that despite the size of it was, I couldn't make a profit and I turned down all that work because I just couldn't do it on the basis on which the Melbourne engineers were working.

JNL

Mr. Macmillan, thank you very much for your time.